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Election/Restriction

The Examiner has required an affirmation of the June 10, 2002, provisional election by Applicant's counsel of Claims 1-31 with traverse. Applicant hereby affirms the election with traverse. MPEP §803 explicitly states: "If the search and examination of the entire application can be made without serious burden, the examiner *must* examine it on the merits even though it includes claims to independent or distinct inventions." Applicant submits that the search and examination of an apparatus for depositing a uniform coating and a method of depositing a uniform coating using the claimed apparatus do not impose a serious burden upon the Examiner, and that the entire application should be examined on the merits.

Objection to the Drawings

The Examiner has objected to the drawings, requiring that Figure 1 be designated by legend as --Prior Art--. Applicant submits that Figure 1 has been amended accordingly, as evidenced by the circled addition on the marked-up copy of Figure 1, submitted herewith.

Objection to the Specification

The Examiner has objected to the specification due to informalities, and has required that paragraph 21 on page 7 of the specification be amended by inserting --now U.S. Patent No. 6,397,776,-- after "Barry Lee-Mean Yang et al.," and substituting --09/683,148-- for "09/". Applicant submits that paragraph has been amended accordingly and that the Examiner's objection is thus overcome.

Applicant also submits that paragraph 39 on page 13 of the specification has also been amended by deleting "crew" and substituting --screw-- therefor to correct a misspelling. Applicant submits that the amendment adds no new matter to the application.

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Rejection under 35 U.S.C. §102(e)

Claims 1-14, 18-20, 22, and 25-31 have been rejected under 35 U.S.C. §102(e) as being anticipated by Hwang (U.S. Patent 6,383,953 B2).

Applicant respectfully submits that, in order to anticipate under §102, a reference must teach all of the limitations of a claim.

Applicant submits that Claims 1, 10, and 18 have each been amended to clarify the relationship between the common reactant gas injector 220 and electrodes (i.e., cathode 214 and anode 216) of each plasma source 212 in the array of plasma sources 210 by reciting the limitation that the common reactant gas injector 220 is disposed in the deposition chamber 204 and between the electrodes (anodes) of the plasma sources 212 and substrate 230. See Figures 2 and 3 and paragraphs 31 and 32, which are found on page 10 of the specification.

Applicant submits that Hwang does not teach a common reactant gas injector that is disposed between the anode and substrate. Instead, the reference discloses an apparatus in which supply plate 312 is not located between the electrodes 212 of the plurality of plasma sources and the substrate 306. The reference, in column 7, lines 6-9, states: "With reference to FIG. 5, a plurality of spray holes 314 are formed at the reactive gas supply plate 312, and the outer electrodes 212 of the plurality of plasma torches *penetrate the supply plate 312* (emphasis added)." Applicant therefore submits that, because the reference does not teach all of the limitations of amended independent Claims 1, 10, and 18, the rejection of these claims and the claims dependent thereon under 35 U.S.C. §102(e) as being anticipated by Hwang is successfully overcome.

Rejection under 35 U.S.C. §103(a)

Claims 1-31 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Knowles et al. (U.S. Patent 5,560,779) in view of Matsuada et al. (U.S. Patent 6,189,485 B1).

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Applicant submits that, in order to establish a *prima facie* ease of obviousness, the references must teach or suggest all of the claim limitations of the present invention.

Applicant submits that the combination of Knowles et al. and Matsuada et al. fail to teach an apparatus having at least one array of a plurality of plasma sources, wherein each of the plasma sources includes a cathode and an anode. As pointed out by the Examiner on page 6 of the June 19 Office Action, Knowles et al. instead teach an apparatus comprising a single plasma generator 80. See Figure 7 and column 5, lines 19-41, of the reference. Applicant submits that Matsuada et al. fail to teach this limitation as well.

As noted by the Examiner on page 7 of the June 19 Office Action, the Matsuada et al. teach a tubular body forming electrodes and having a plurality of gas openings through which material gas enters the electrode. In contrast to Matsuada et al., Applicant submits that, as previously discussed, the common reactant gas injector of the present invention does *not* form part of an electrode. Instead, the common reactant gas injector of the present invention is independent of both the cathodes and anodes and is disposed in the deposition chamber and between the anodes (i.e., electrodes) of the plasma sources and the substrate.

Applicant therefore submits that, because the combination of references neither teaches nor suggests all of the limitations of the present invention, the rejection of Claims 1-31 under 35 U.S.C. §103(a) as being unpatentable over Knowles et al. in view of Matsuada et al. is successfully overcome.

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In light of the amendment and remarks presented herein, Applicant submits that the case is in condition for immediate allowance and respectfully requests such action. If, however, any issues remain unresolved, the Examiner is invited to telephone the Applicant's counsel at the number provided below.

Respectfully submitted,



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**ATTACHMENT A**

Marked-up versions of amended paragraphs 21 and 39 of the specification are provided below.

Marked-up version of amended paragraph 21, found on page 7 of the specification:

Referring to the drawings in general and to Figure 1 in particular, it will be understood that the illustrations are for the purpose of describing a preferred embodiment of the invention and are not intended to limit the invention thereto. An apparatus 100 for depositing a uniform coating on a macroscopically planar - or flat - surface using an array 110 comprising a plurality of expanding thermal plasma sources 112 is schematically shown in Figure 1. The apparatus 100 shown in Figure 1 has been described in "Apparatus and Method for Large Area Chemical Vapor Deposition Using Expanding Thermal Plasma Generators," U.S. Patent Application 09/681,820, by Barry Lee-Mean Yang et al., now U.S. Patent No. 6,397,776, and in "Apparatus and Method for Depositing Large Area Coatings on Non-Planar Surfaces," U.S. Patent Application [09/]09/683,148, by Marc Schaepkens, both of which are incorporated herein by reference in their entirety. Each of the plurality of ETP sources 112 is supplied with at least one reactant gas that reacts with the generated ETP to form a coating on a surface of a substrate (not shown). The at least one reactant gas is supplied to each of the plurality of ETP sources 112 at the same flow rate through individual reactant gas injectors 120. The at least one reactant gas reacts in the plasma generated by each of the plurality of ETP sources 112 to produce species that form the coating.

Marked-up version of amended paragraph 39, found on page 13 of the specification:

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In the present invention, linear orifice density along common reactant gas injector ring 220 can, for example, be varied to equalize flow by replacing some of the set screws having orifices with regular set-screws [crews] into which no orifices have been machined. Orifice conductance may also be varied by using extended set-screws with orifices machined therethrough.

Marked-up versions of amended Claims 1, 10, and 18 are provided below.

Marked-up version of Claim 1:

1. (Amended) An apparatus for depositing a uniform coating on a planar surface of a substrate, said apparatus comprising:

a) at least one array of a plurality of plasma sources for generating a plurality of plasmas, wherein each of said plurality of plasma sources includes a cathode, an anode, and an inlet for a non-reactive plasma source gas disposed in a plasma chamber;

b) a deposition chamber for containing said substrate, wherein said deposition chamber is in fluid communication with said plasma chamber, and wherein said plasma chamber is maintained at a first predetermined pressure and said deposition chamber is maintained at a second predetermined pressure, said second predetermined pressure being less than said first predetermined pressure; and

c) at least one common reactant gas injector disposed in said deposition chamber between said anodes of each of said plurality of plasma sources and said substrate for providing a uniform flow rate of at least one reactant gas into each of said plurality of plasmas.

10. (Amended) A common reactant gas injector for injecting a uniform flow of at least one reactant gas into a plurality of plasmas generated by an array of a plurality of plasma sources, said common reactor injector comprising:

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a) a reactant gas inlet comprising a tubular-walled structure having an interior space through which said at least one reactant gas is supplied from a reactant gas source, wherein said reactant gas inlet is disposed between said array and a substrate;

b) a first plurality of orifices proximate to a first plasma, each of said first plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said reactant gas inlet, wherein said first plurality of orifices is oriented such that said at least one reactant gas passes from said interior space through said first plurality of orifices and is directed into said first plasma at a first flow rate; and

c) a second plurality of orifices proximate to a second plasma, each of said second plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said at least one reactant gas inlet, wherein said second plurality of orifices is oriented such that said at least one reactant gas passes from said interior space through said second plurality of orifices and is directed into said second plasma at a second flow rate, said second flow rate being substantially equal to said first flow rate.

Marked-up version of Claim 18:

18. (Amended) An apparatus for depositing a uniform coating on a surface of a substrate, said apparatus comprising:

a) at least one array of a plurality of plasma sources for generating a plurality of plasmas, wherein at least one of said plurality of plasma sources is an expanding thermal plasma source, wherein each of said plurality of plasma sources includes a cathode, an anode, and an inlet for a non-reactive plasma source gas disposed in a plasma chamber;

b) a deposition chamber for containing said substrate, wherein said deposition chamber is in fluid communication with said plasma chamber, wherein said plasma chamber is maintained at a first predetermined pressure and said deposition

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chamber is maintained at a second predetermined pressure, said second predetermined pressure being less than said first predetermined pressure; and

c) at least one common reactant gas injector disposed in said deposition chamber between said anodes of each of said plurality of plasma sources and said substrate for injecting a uniform flow of at least one reactant gas into each of said plurality of plasmas, said common reactant gas injector comprising: (i) a reactant gas inlet comprising a tubular-walled structure having an interior space through which said reactant gas is supplied from at least one reactant gas source; (ii) a first plurality of orifices proximate to a first plasma, each of said first plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said reactant gas inlet, wherein said first plurality of orifices is oriented such that said reactant gas passes from said interior space through said first plurality of orifices and is directed into said first plasma at a first flow rate; and (iii) a second plurality of orifices proximate to said second plasma, each of said second plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said at least one reactant gas inlet, wherein said second plurality of orifices is oriented such that said reactant gas passes from said interior space through said second plurality of orifices and is directed into said second plasma at a second flow rate, said second flow rate being substantially equal to said first flow rate.

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Serial No.:

Inventor: Marc (NMN) Schaepkens

Docket No.: RD-28,667

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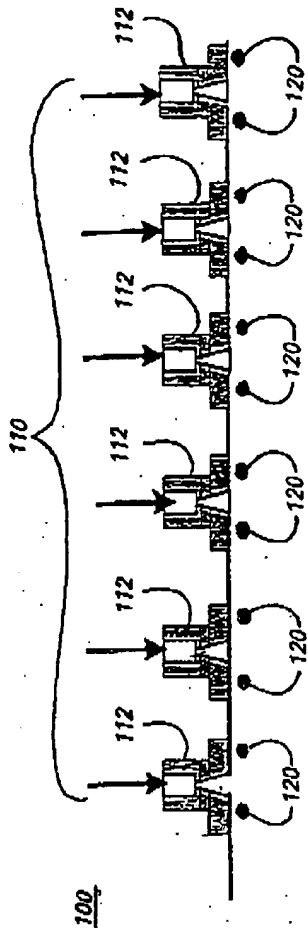
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*approved*

*p.t. 11-20-02*

*Prior Art*



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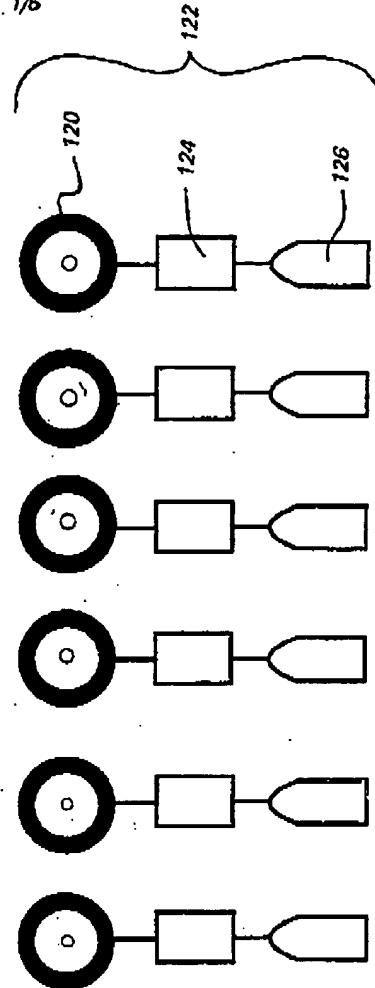


FIG.1

*(Amended)*